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Kurita et al.

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(54) **IMAGE FORMING APPARATUS AND FIXING DEVICE**

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(30) **Foreign Application Priority Data**

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G03G 15/20 (2006.01)
G03G 15/16 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/161*** (2013.01); ***G03G 15/2025*** (2013.01); ***G03G 15/2028*** (2013.01); *G03G 2215/20* (2013.01)

(58) **Field of Classification Search**
CPC G03G 15/2064; G03G 15/2067
USPC 399/67, 328, 329
See application file for complete search history.

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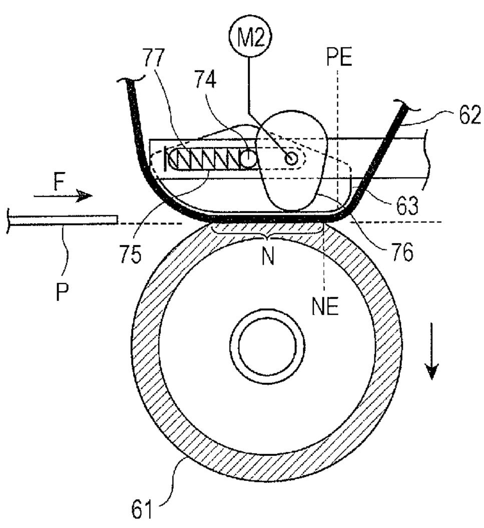
(57) **ABSTRACT**

An image forming apparatus includes an image forming unit that forms an image on a recording material; an endless belt member; a pressure member that applies pressure to the belt member; a pressing member that presses the belt member from an inner side of the belt member towards the pressure member; and an adjusting section that adjusts a position of an end portion of a nip part at a downstream side in a movement direction of the recording material and a position of a curved portion of the belt member by moving or deforming the pressing member, the nip part being formed by the belt member and the pressure member, the curved portion of the belt member being formed by an end portion of the pressing member at a downstream side in the movement direction of the recording material.

7 Claims, 12 Drawing Sheets



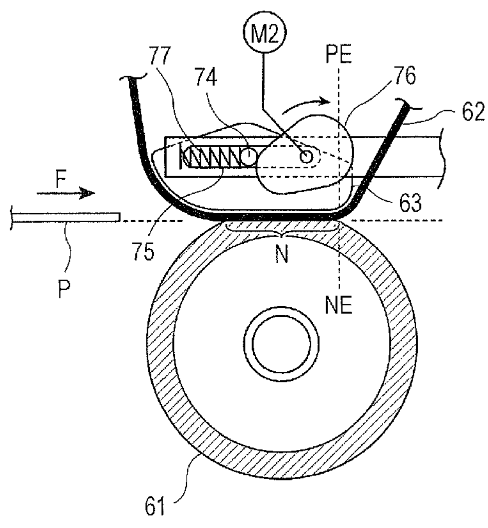
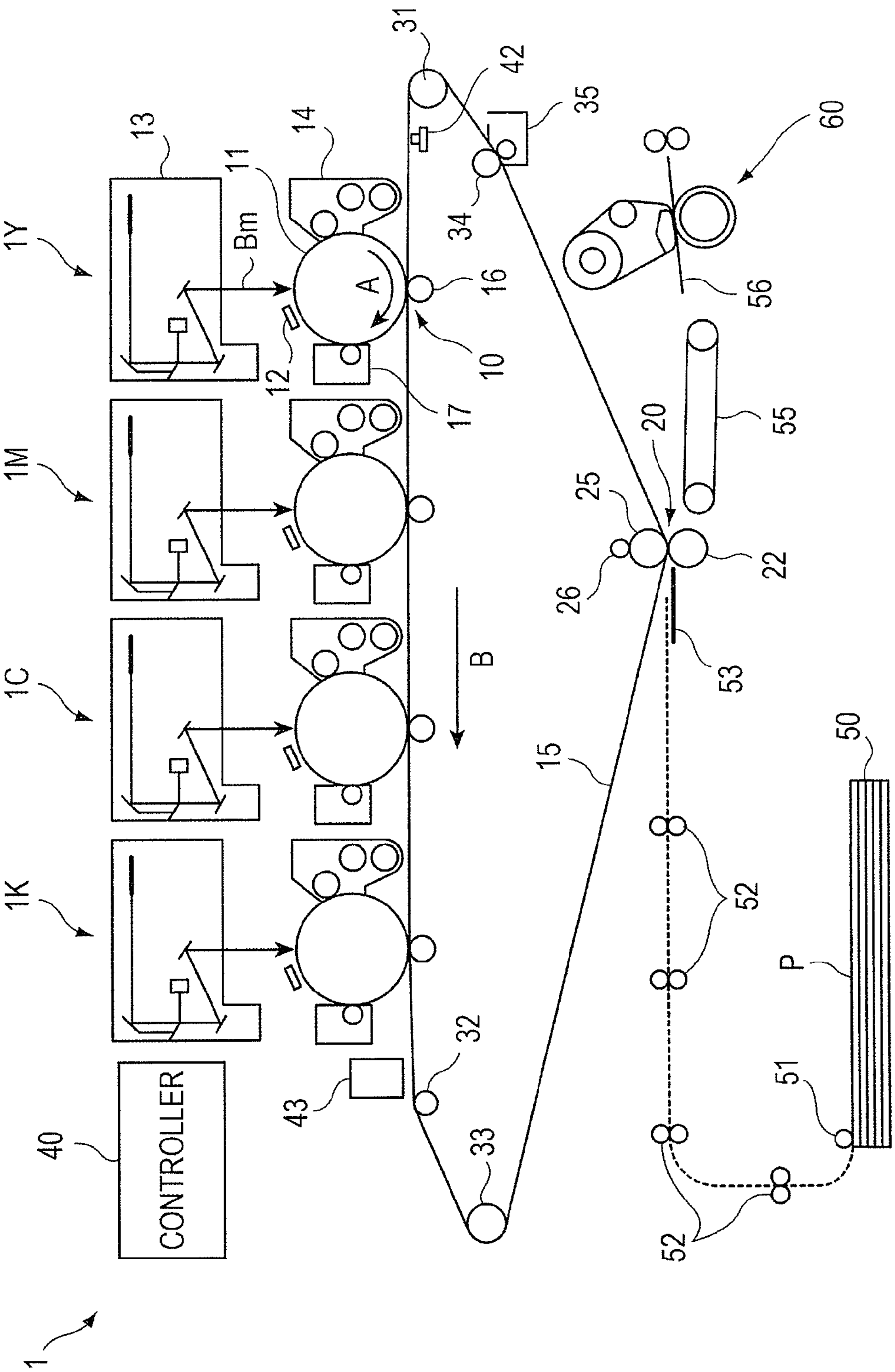


FIG. 1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26
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32
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B
Bm
P

FIG. 2

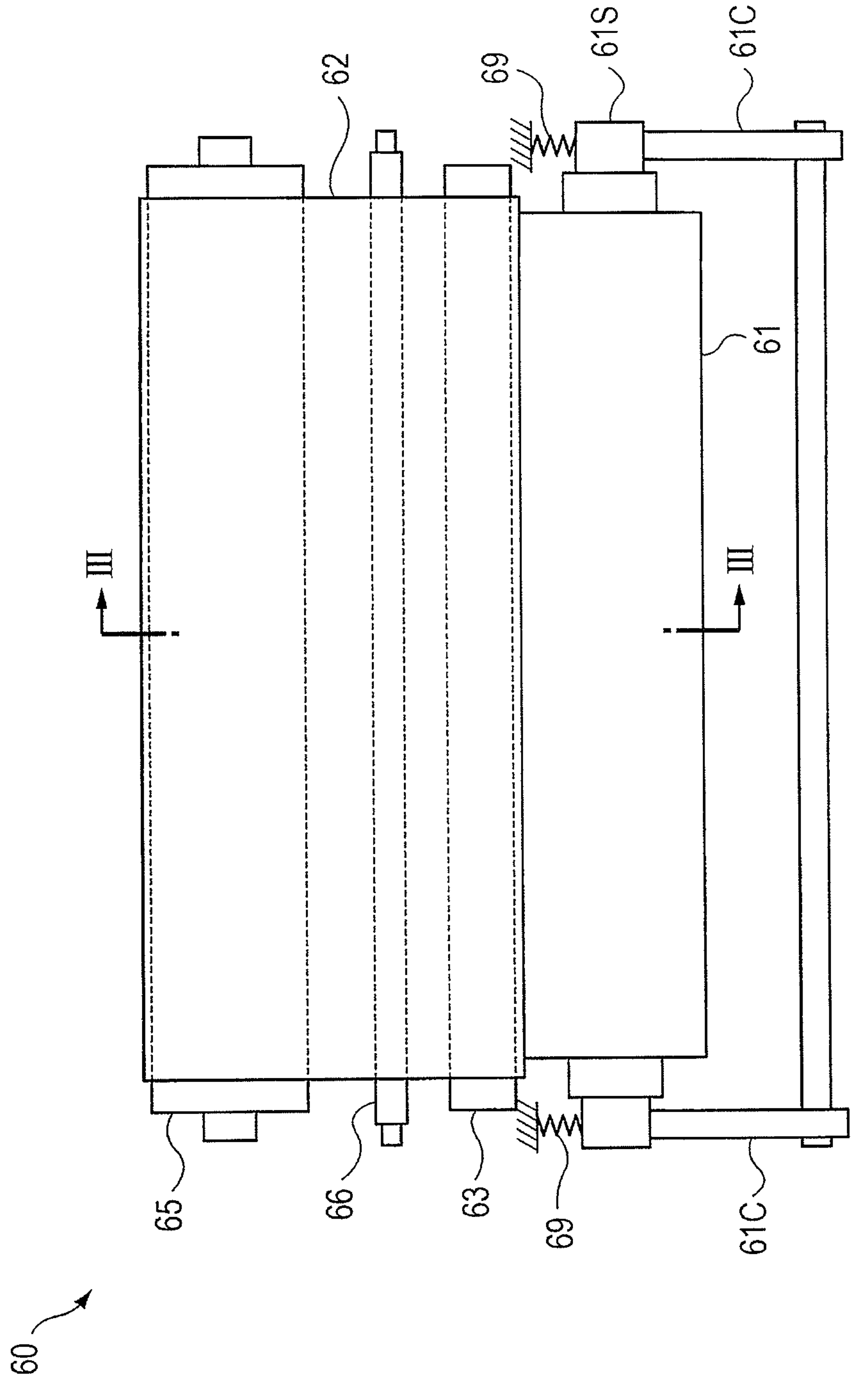


FIG. 3

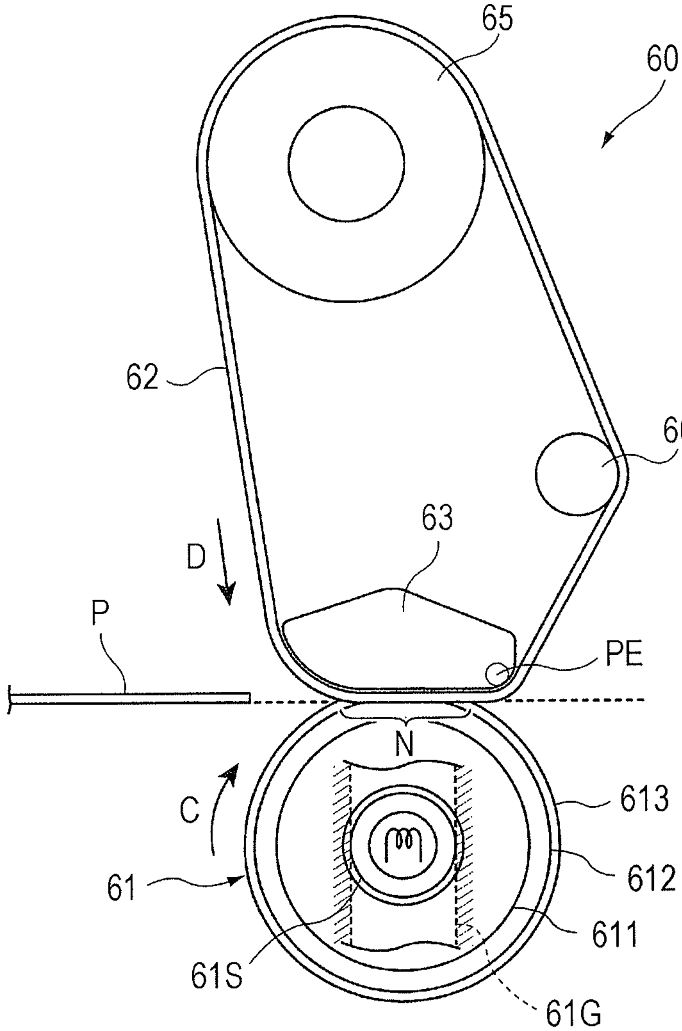


FIG. 4B

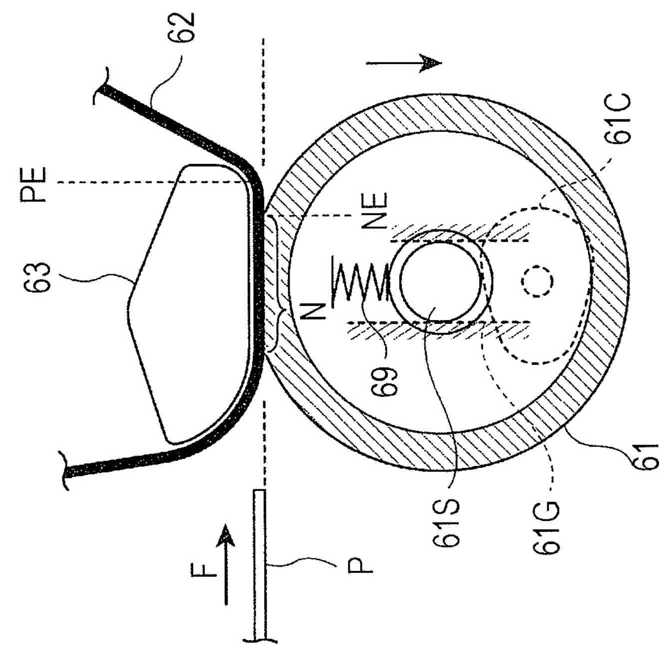


FIG. 4A

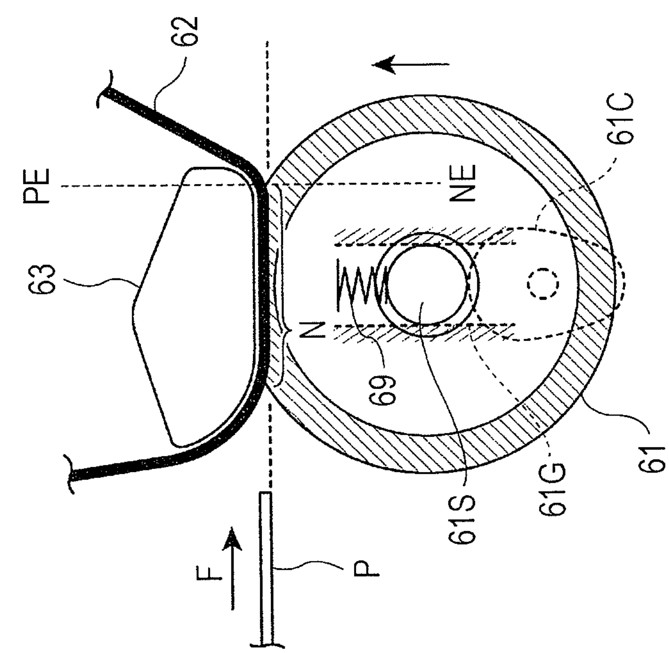


FIG. 5A

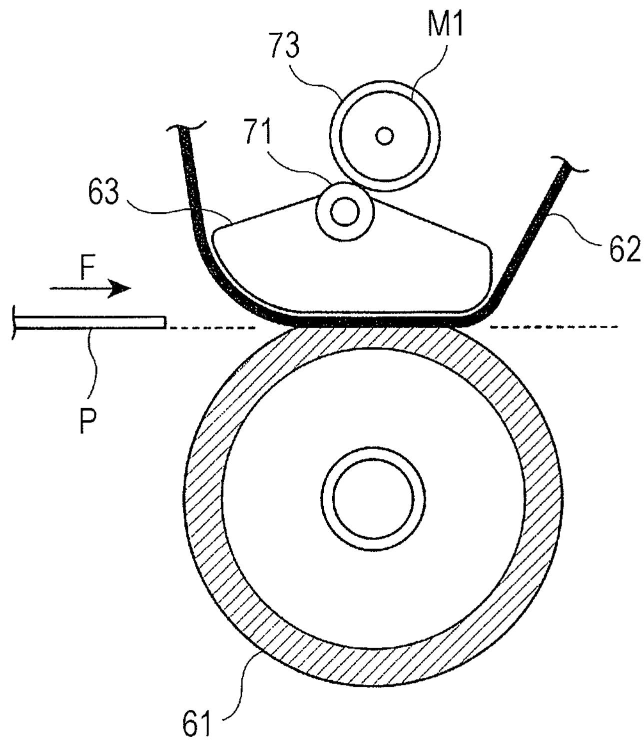


FIG. 5B

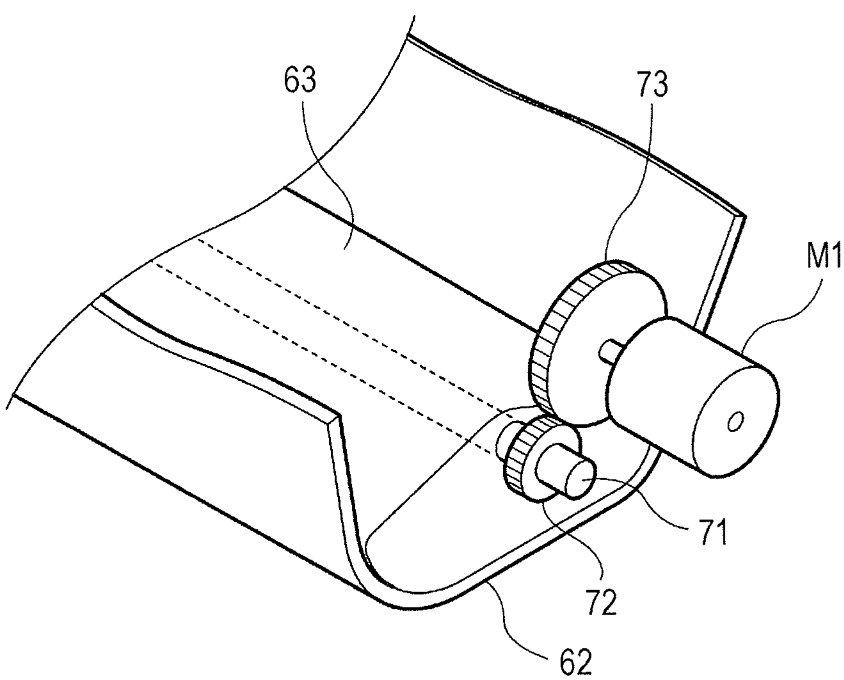


FIG. 6B

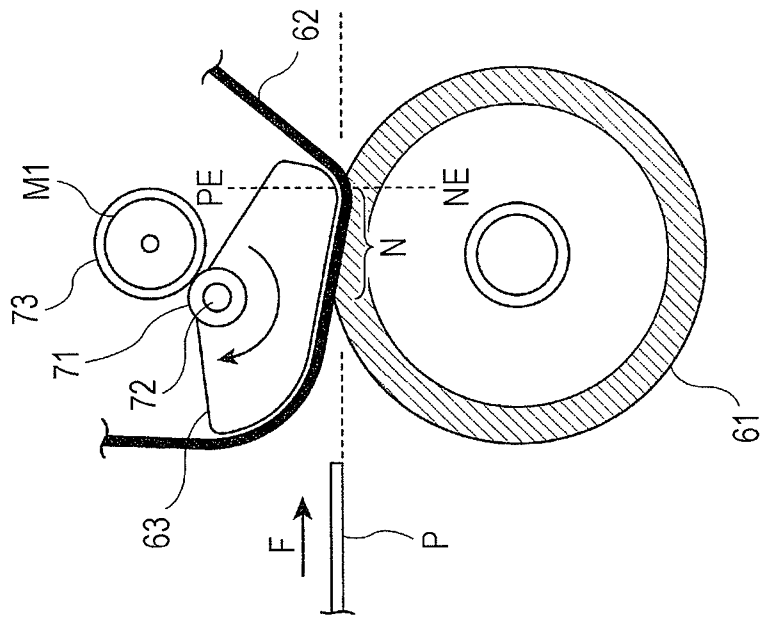


FIG. 6A

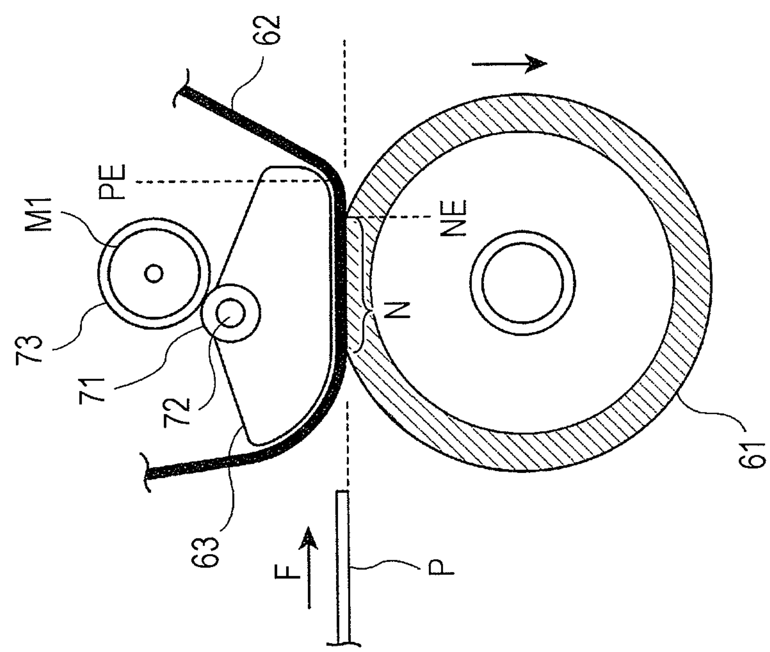


FIG. 7A

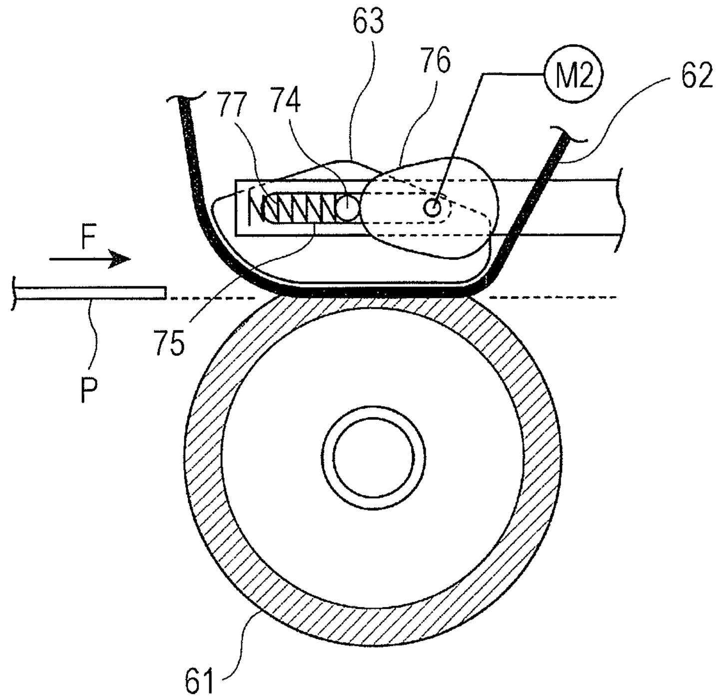


FIG. 7B

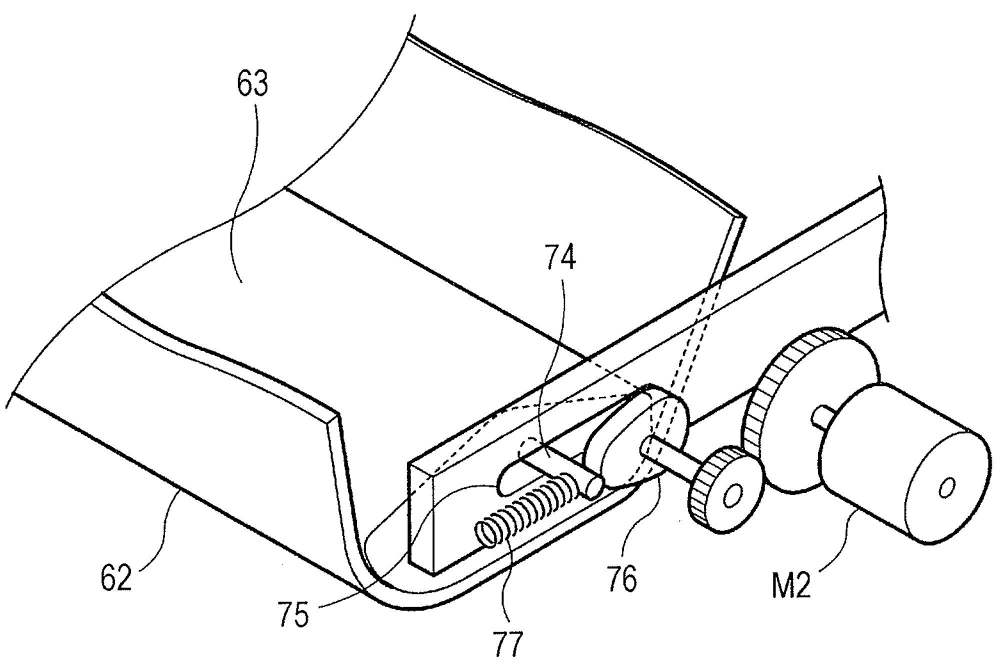


FIG. 8A

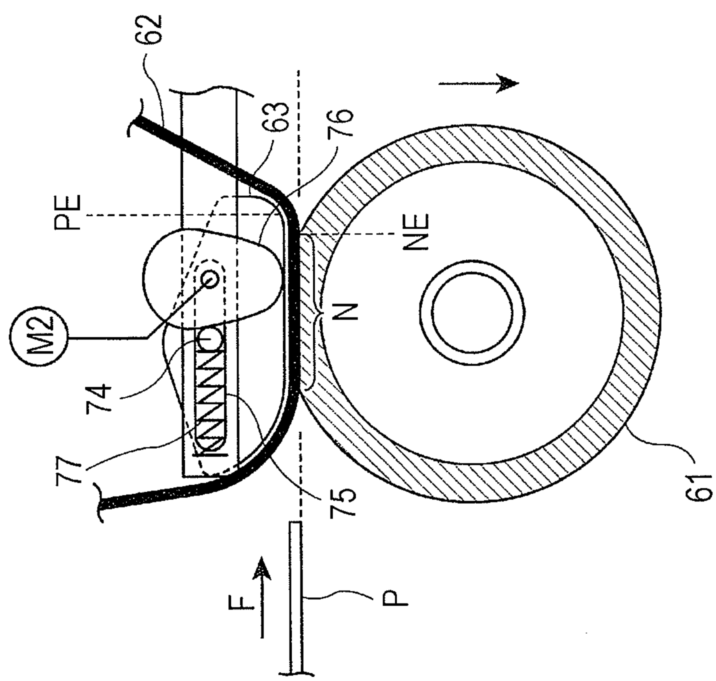


FIG. 8B

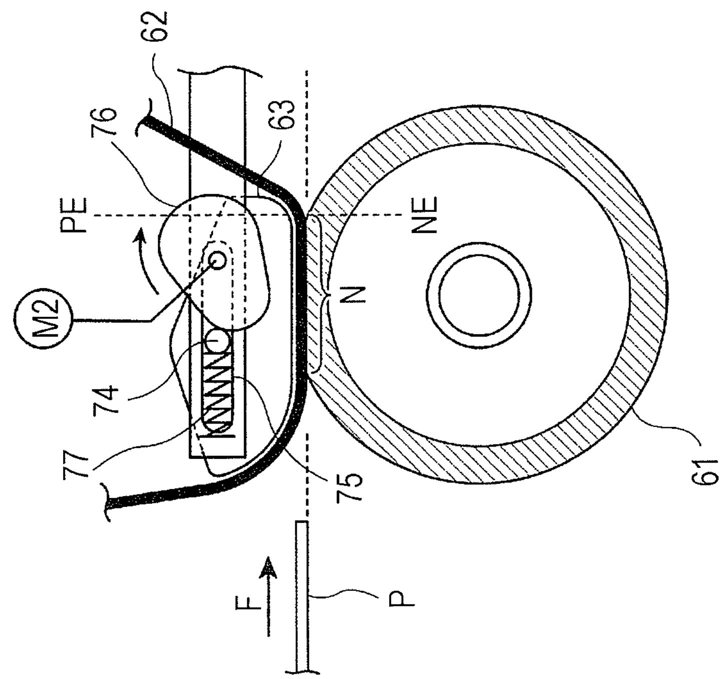
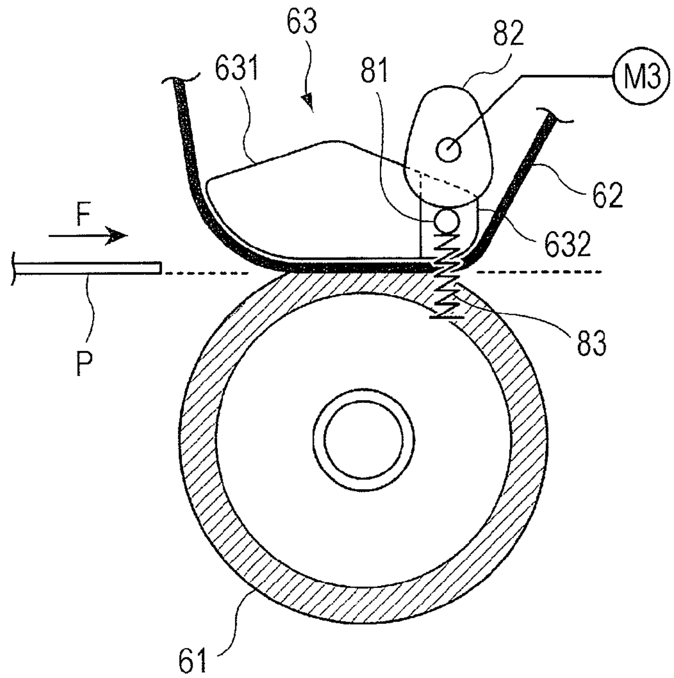


FIG. 9A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M3
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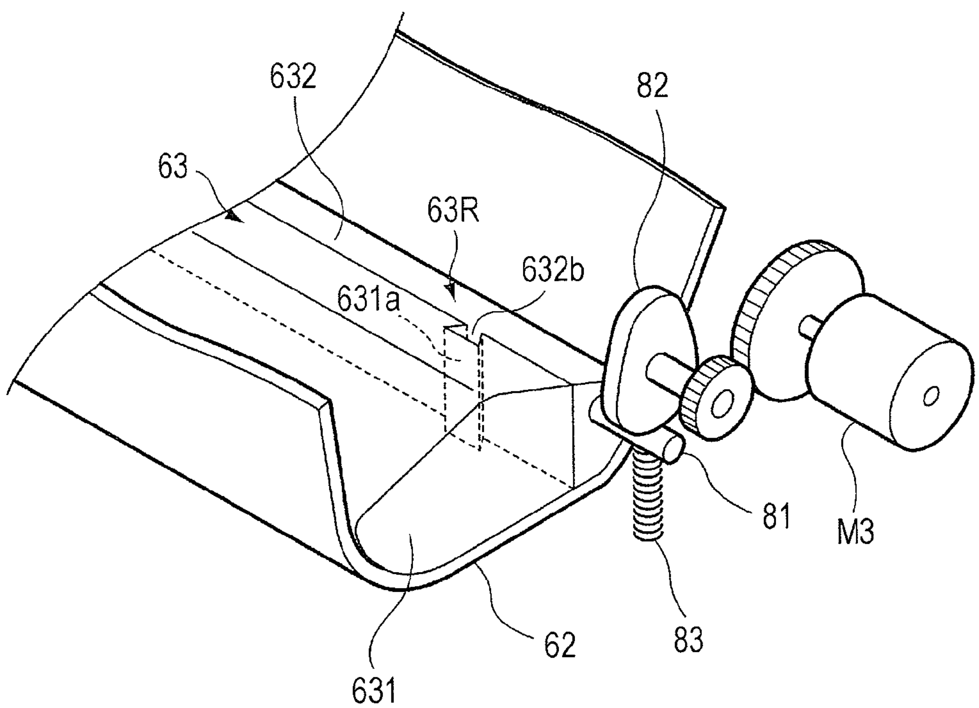
632
F
83
P
61

FIG. 9B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63R
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631

FIG. 10A

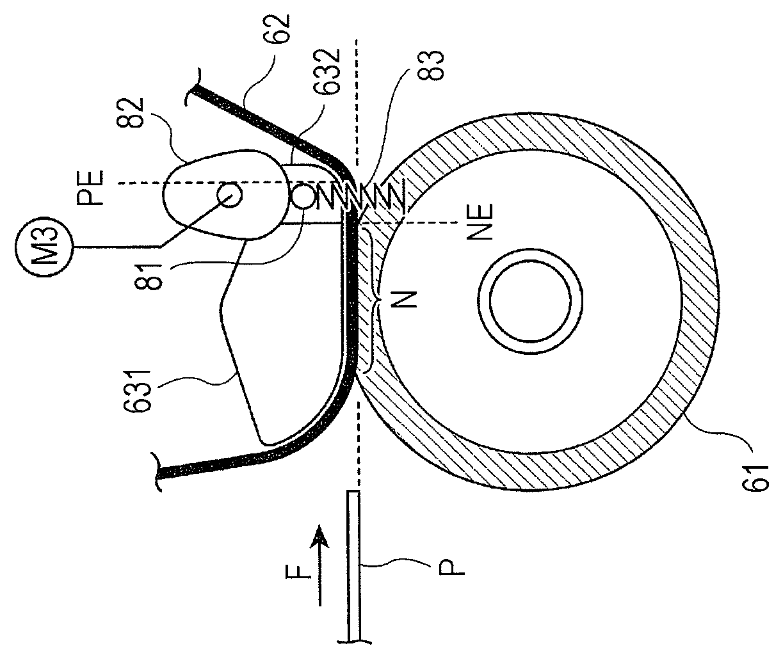

FIG. 10B

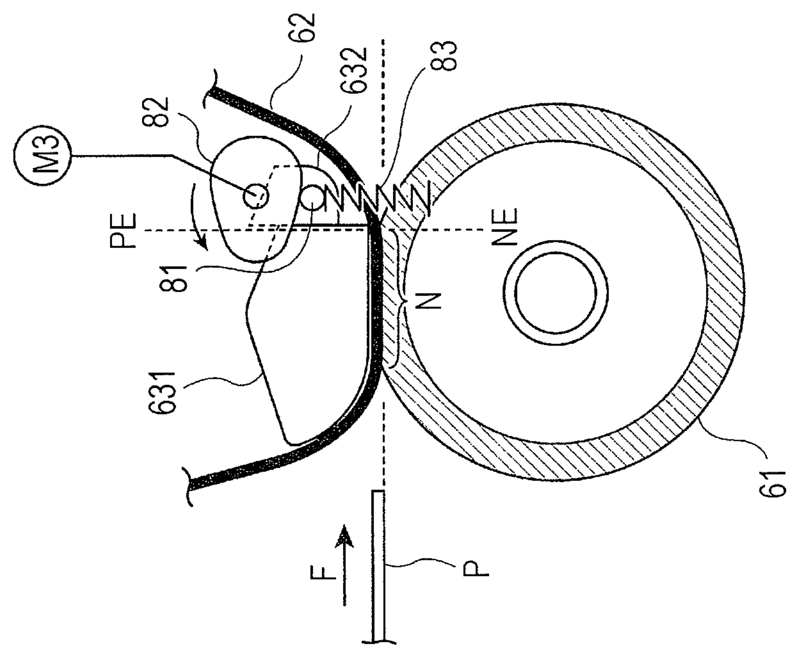

FIG. 11

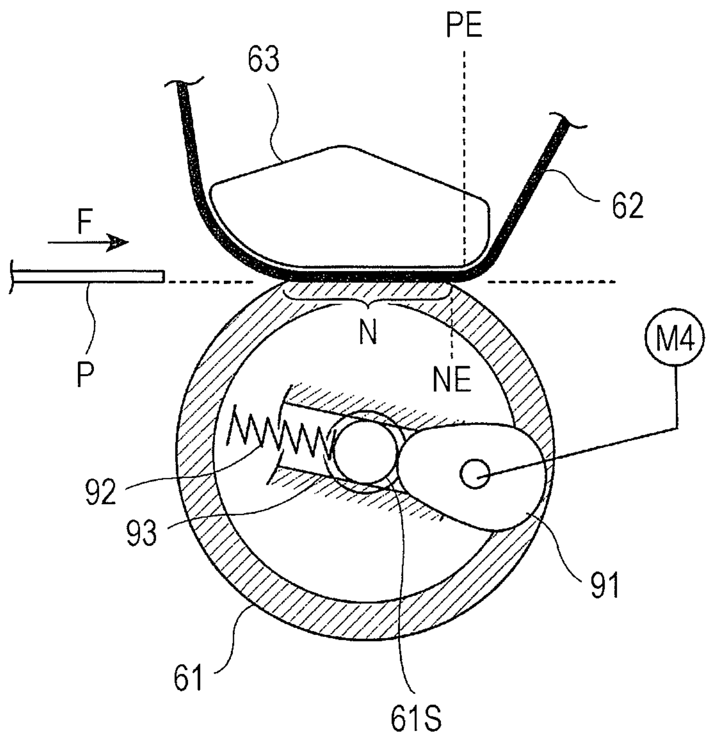

FIG. 12

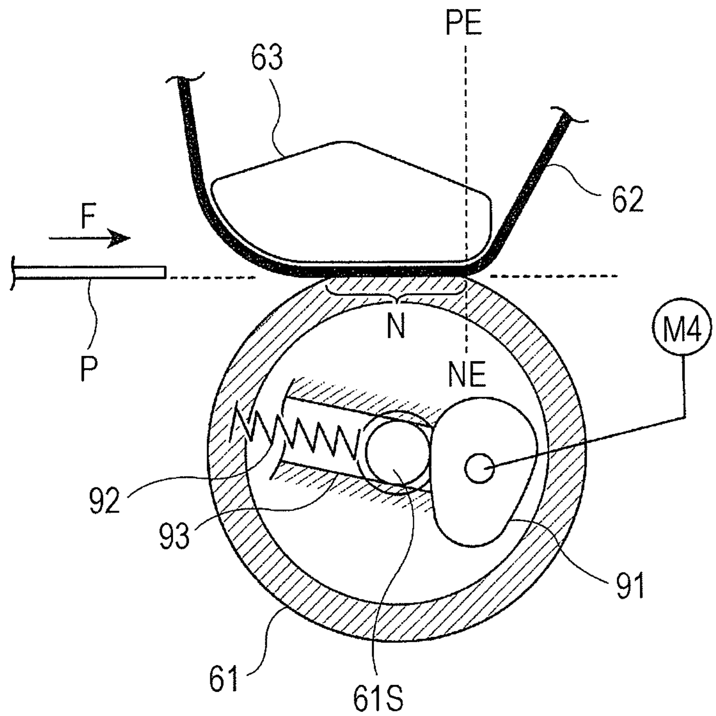

IMAGE FORMING APPARATUS AND FIXING DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based on and claims priority under 35 USC 119 from Japanese Patent Application No. 2010-268683 filed Dec. 1, 2010.

BACKGROUND

(i) Technical Field

The present invention relates to an image forming apparatus and a fixing device.

SUMMARY

According to an aspect of the invention, there is provided an image forming apparatus including an image forming unit that forms an image on a recording material; an endless belt member that is rotatably provided and that has a curved portion; a pressure member that is provided at an outer peripheral surface of the belt member so as to contact the outer peripheral surface of the belt member, the pressure member applying pressure to the belt member; a pressing member that presses the belt member from an inner side of the belt member towards the pressure member; and an adjusting section that adjusts a position of an end portion of a nip part at a downstream side in a movement direction of the recording material and a position of the curved portion of the belt member by moving or deforming the pressing member, the nip part being formed by the belt member and the pressure member, the curved portion of the belt member being formed by an end portion of the pressing member at a downstream side in the movement direction of the recording material.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the present invention will be described in detail based on the following figures, wherein:

FIG. **1** shows an image forming apparatus to which an exemplary embodiment is applied;

FIG. **2** shows the entire structure of a fixing device according to the exemplary embodiment;

FIG. **3** is a sectional view of the fixing device shown in FIG. **2** taken along line III-III;

FIGS. **4**A and **4**B illustrate a high-pressure state and a low-pressure state of the fixing device;

FIGS. **5**A and **5**B illustrate an adjusting mechanism of a fixing device to which a first exemplary embodiment is applied;

FIGS. **6**A and **6**B illustrate the operations of the fixing device to which the first exemplary embodiment is applied;

FIGS. **7**A and **7**B illustrate an adjusting mechanism of a fixing device to which a second exemplary embodiment is applied;

FIGS. **8**A and **8**B illustrate the operations of the fixing device to which the second exemplary embodiment is applied;

FIGS. **9**A and **9**B illustrate an adjusting mechanism of a fixing device to which a third exemplary embodiment is applied;

FIGS. **10**A and **10**B illustrate the operations of the fixing device to which the third exemplary embodiment is applied;

FIG. **11** illustrates an adjusting mechanism of a fixing device to which a fourth exemplary embodiment is applied; and

FIG. **12** illustrates the operations of the fixing device to which the fourth exemplary embodiment is applied.

DETAILED DESCRIPTION

Exemplary embodiments of the present invention will hereunder be described in detail with reference to the attached drawings.

First Exemplary Embodiment

FIG. **1** shows an image forming apparatus **1** to which an exemplary embodiment is applied.

The image forming apparatus **1** shown in FIG. **1** is an intermediate-transfer image forming apparatus **1** that is generally called a tandem image forming apparatus. The image forming apparatus **1** includes image forming units **1**Y, **1**M, **1**C, and **1**K, a first transfer unit **10**, a second transfer unit **20**, and a fixing device **60**. The image forming units **1**Y, **1**M, **1**C, and **1**K form toner images of respective color components by electrophotography. The first transfer unit **10** successively transfers the toner images of the respective color components formed by the respective image forming units **1**Y, **1**M, **1**C, and **1**K to an intermediate transfer belt **15** by first transfer operations. The second transfer unit **20** transfers all superposed toner images transferred to the intermediate transfer belt **15** together to a sheet P (recording material) by second transfer operations. The fixing device **60** fixes the images transferred by the second transfer operations to the sheet P. The image forming apparatus **1** also includes a controller **40** that controls the fixing device **60** and each section, such as an adjusting mechanism (described later), of the fixing device **60**.

In the exemplary embodiment, each of the image forming units **1**Y, **1**M, **1**C, and **1**K (serving as exemplary image forming sections) has electrophotographic devices, such as a charger **12**, a laser exposure unit **13** (illustrated exposure beam is indicated by Bm), a developing unit **14**, a first transfer roller **16**, and a drum cleaner **17**, successively disposed around a photoconductor drum **11** that rotates in the direction of arrow A. Each charger **12** charges its corresponding photoconductor drum **11**. Each laser exposure unit **13** forms an electrostatic latent image on its corresponding photoconductor drum **11**. Each developing unit **14** contains toner of its corresponding color component, and makes visible the electrostatic latent image on its corresponding photoconductor drum **11** with the toner. At each first transfer unit **10**, each first transfer roller **16** transfers to the intermediate transfer belt **15** the toner image of its corresponding color component formed on the corresponding photoconductor drum **11**. Each drum cleaner **17** removes residual toner on its corresponding photoconductor drum **11**. The image forming units **1**Y, **1**M, **1**C, and **1**K are such that the image forming unit **1**Y corresponding to yellow (Y), the image forming unit **1**M corresponding to magenta (M), the image forming unit **1**C corresponding to cyan (C), and the image forming unit **1**K corresponding to black (K) are linearly disposed in that order from an upstream side of the intermediate transfer belt **15**.

The intermediate transfer belt **15**, which is an intermediate transfer body, is a film-like endless belt in which a suitable amount of antistatic agent, such as carbon black, is contained in resin, such as polyimide or polyamide. The intermediate transfer belt **15** is formed so that its volume resistivity is in the range of from 10^6 to 10^{14} Ωcm, and its thickness is, for example, on the order of 0.1 mm. The intermediate transfer belt **15** is circulated and driven at a predetermined velocity in the direction of arrow B shown in FIG. **1** by various rollers. The various rollers include a driving roller **31**, a support roller **32**, a tension roller **33**, a backup roller **25**, and a cleaning backup roller **34**. The driving roller **31** rotationally drives the intermediate transfer belt **15** by being driven by a motor (not shown) having excellent constant velocity performance. The support roller **32** supports the intermediate transfer belt **15** and extends linearly along a direction of disposition of the photoconductor drums **11**. The tension roller **33** applies tension to the intermediate transfer belt **15** and functions as a correcting roller that prevents meandering of the intermediate transfer belt **15**. The backup roller **25** is provided at the second transfer unit **20**. The cleaning backup roller **34** is provided at a cleaning unit for scraping off residual toner on the intermediate transfer belt **15**.

Each first transfer unit **10** includes the first transfer roller **16** disposed so as to oppose the corresponding photoconductor drum **11** with the intermediate transfer belt **15** being interposed therebetween. Each first transfer roller **16** includes a shaft and a sponge layer serving as an elastic layer that is fixed around the shaft. Each shaft is a cylindrical bar formed of a metal, such as iron or SUS. Each sponge layer is a sponge-like cylindrical roller that is formed of rubber blend of NBR, SBR, and EPDM combined with a conductant agent such as carbon black, and that has a volume resistivity of $10^{7.5}$ to $10^{8.5}$ Ωcm. Each first transfer roller **16** is disposed so as to press-contact the corresponding photoconductor drum **11** with the intermediate transfer belt **15** being interposed therebetween. Each first transfer roller **16** is such that a voltage (first transfer bias) having a polarity that is opposite to a charging polarity of the toner is applied thereto. The charging polarity of the toner is a negative polarity, and will hereunder be assumed as being a negative polarity. This causes the toner images on the respective photoconductor drums **11** to be successively electrostatically attracted to the intermediate transfer belt **15**, so that superimposed toner images are formed on the intermediate transfer belt **15**.

The second transfer unit **20** includes the backup roller **25** and a second transfer roller **22** disposed at a toner-image-carrying-surface side of the intermediate transfer belt **15**. The surface of the backup roller **25** is formed of a tube of rubber blend of EPDM and NBR dispersed with carbon, whereas the interior of the backup roller **25** is formed of EPDM rubber. The backup roller **25** is formed so that its surface resistivity is 10^7 to 10^{10} Ω/sq, and its hardness is, for example, 70° (Asker C). The backup roller **25** is disposed at an inner surface side of the intermediate transfer belt **15**, and forms an opposing electrode of the second transfer roller **22**. A metallic power supply roller **26** to which second transfer bias is applied is disposed so as to contact the backup roller **25**.

The second transfer roller **22** includes a shaft and a sponge layer serving as an elastic layer that is fixed around the shaft. The shaft is a cylindrical bar formed of a metal, such as iron or SUS. The sponge layer is a sponge-like cylindrical roller that is formed of rubber blend of NBR, SBR, and EPDM combined with a conductant agent such as carbon black, and that has a volume resistivity of $10^{7.5}$ to $10^{8.5}$ Ωcm. The second transfer roller **22** is disposed so as to press-contact the backup roller **25** with the intermediate transfer belt **15** being interposed therebetween. The second transfer roller **22** is connected to ground, and the second transfer bias is generated between the second transfer roller **22** and the backup roller **25**, so that, by the second transfer operations, the toner images are transferred to a sheet P that is transported to the second transport unit **20**.

An intermediate transfer belt cleaner **35** is provided at a side of the intermediate transfer belt **15** that is situated downstream from the second transfer unit **20**. The intermediate transfer belt cleaner **35** is capable of contacting and separating from the intermediate transfer belt **15**. The intermediate transfer belt cleaner **35** cleans the surface of the intermediate transfer belt **15** by removing residual toner and paper dust on the intermediate transfer belt **15** after the second transfer. A reference sensor (home position sensor) **42** is disposed upstream from the yellow image forming unit **1**Y. The reference sensor **42** generates a reference signal serving as a reference for setting an image formation timing at each of the image forming units **1**Y, **1**M, **10**, and **1**K. An image density sensor **43** for adjusting image quality is disposed downstream from the black image forming unit **1**K. The reference sensor **42** is formed so as to recognize a predetermined mark on the inner side of the intermediate transfer belt **15**, and generate the reference signal, so that, on the basis of an instruction from the controller **40** based on the recognition of this reference signal, each of the image forming units **1**Y, **1**M, **1**C, and **1**K start forming images.

In the image forming apparatus **1** according to the exemplary embodiment, a sheet transporting system includes a sheet holding unit **50**, a pickup roller **51**, transport rollers **52**, a transport path **53**, a transport belt **55**, and a fixing entrance guide **56**. The sheet holding unit **50** holds sheets P. The pickup roller **51** takes out and transports the sheets P stacked in the sheet holding unit **50** at a predetermined timing. The transport rollers **52** transport the sheets P that are sent out by the pickup roller **51**. The transport path **53** allows the sheets P transported by the transport rollers **52** to be sent into the second transfer unit **20**. The transfer belt **55** transports towards the fixing device **60** the sheets P that are transported after the second transfer by the second transfer roller **22**. The fixing entrance guide **56** guides the sheets P to the fixing device **60**.

Next, a basic image formation process of the image forming apparatus **1** according to the exemplary embodiment will be described. In the image forming apparatus **1** shown in FIG. **1**, image data that is output from, for example, an image reading device (not shown) or a personal computer (PC) (not shown) is processed by an image processor (not shown), after which the image forming units **1**Y, **1**M, **1**C, and **1**K form the images. In the image processor, image processing is performed on input reflectance data. Examples of image processing are shading correction, positional displacement correction, brightness/color space conversion, gamma correction, and various image editings (such as frame erasing, color editing, and movement editing). The image data that has been processed is converted into pieces of color material gradation data corresponding to the four colors, Y, M, C, and K. Then, these pieces of data are output to the laser exposure units **13**.

At the laser exposure units **13**, in accordance with the pieces of color material gradation data that have been input, the photoconductor drums **11** of the respective image forming units **1**Y, **1**M, **1**C, and **1**K are irradiated with the exposure beams Bm emitted from, for example, semiconductor lasers. After charging the surfaces of the photoconductor drums **11** of the respective image forming units **1**Y, **1**M, **1**C, and **1**K using the respective chargers, the surfaces of the photoconductor drums **11** are scanned and exposed by the laser exposure units **13**, so that electrostatic latent images are formed on the surfaces of the photoconductor drums **11**. The formed electrostatic latent images are developed as toner images of the respective colors, Y, M, C, and K, by the respective image forming units **1**Y, **1**M, **1**C, and **1**K.

At the first transfer units **10** where the photoconductor drums **11** and the intermediate transfer belt **15** contact each other, the toner images formed on the photoconductor drums **11** of the image forming units **1**Y, **1**M, **1**C, and **1**K are transferred to the intermediate transfer belt **15**. More specifically, at the first transfer units **10**, the respective first transfer rollers **16** apply voltages (first transfer biases) having a polarity that is opposite to the charging polarity (negative polarity) of the toner to a base material of the intermediate transfer belt **15**, so that the toner images are successively superimposed upon the surface of the intermediate transfer belt **15**, as a result of which the first transfer operations are performed.

After successively transferring the toner images onto the surface of the intermediate transfer belt **15** by the first transfer operations, the intermediate transfer belt **15** is moved, so that the toner images are transported to the second transfer unit **20**. When the toner images are transported to the second transfer unit **20**, the pickup roller **51** in the sheet transporting system rotates in accordance with a timing in which the toner images are transported to the second transfer unit **20**, to supply sheets P from the sheet holding unit **50**. The sheets P supplied by the pickup roller **51** are transported by the transport rollers **52**, and reach the second transfer unit **20** through the transport path **53**. Before the sheets P reach the second transfer unit **20**, the sheets P are stopped once, and a registration roller (not shown) is rotated in accordance with a timing in which the intermediate transfer belt **15** holding the toner images moves, so that the positions of the sheets P and the positions of the toner images are adjusted.

At the second transfer unit **20**, the second transfer roller **22** is pressed against the backup roller **25** through the intermediate transfer belt **15**. At this time, the sheet P that is transported in accordance with the timing is interposed between the intermediate transfer belt **15** and the second transfer roller **22**. Here, when the feed roller **26** applies a voltage (second transfer bias) having a polarity that is the same as the charging polarity (negative polarity) of the toner, a transfer electric field is generated between the second transfer roller **22** and the backup roller **25**. Then, all unfixed toner images that are held by the intermediate transfer belt **15** are together electrostatically transferred to the sheet P at the second transfer unit **20** where the sheet P is pressed by the second transfer roller **22** and the backup roller **25**.

Thereafter, the second transfer roller **22** transports the sheet P to which the toner images are electrostatically transferred as it is while the sheet P is separated from the intermediate transfer belt **15**, and is transported to the transport belt **55** provided at a downstream side of the second transfer roller **22** in a sheet transportation direction. At the transport belt **55**, the sheet P is transported to the fixing device **60** in accordance with an optimal transport velocity in the fixing device **60**. The unfixed toner images on the sheet P that is transported to the fixing device **60** are fixed to the sheet P by heat and pressure at the fixing device **60**. The sheet P on which the fixed images are formed is transported to a sheet-discharge stacking unit provided at a discharge unit of the image forming apparatus **1**.

After the transfer of the toner images to the sheet P ends, any residual toner remaining on the intermediate transfer belt **15** is transported to the cleaning unit as the intermediate transfer belt **15** rotates, and is removed from the intermediate transfer belt **15** by the cleaning backup roller **34** and the intermediate transfer belt cleaner **35**.

Structure of Fixing Device

The fixing device **60** used in the image forming apparatus **1** according to the exemplary embodiment will be described in more detail.

FIG. **2** shows the entire structure of the fixing device **60** according to the exemplary embodiment. FIG. **3** is a sectional view of the fixing device **60** shown in FIG. **2** taken along line III-III.

As shown in FIG. **2**, the fixing device **60** to which the exemplary embodiment is applied includes a pressure roller **61**, a fixing belt **62**, a pressing pad **63**, a roller **65**, and a tension roller **66**. The pressure roller **61** serves as an exemplary pressure member. The fixing belt **62** serves as an exemplary belt member that is press-contacted by the pressure roller **61**, and that rotates. The pressing pad **63** serves as an exemplary pressing member that is pressed by the pressure roller **61** via the fixing belt **62**. The fixing belt **62** is placed around the roller **65** and the pressing pad **63** in a tensioned state. The tension roller **66** applies a predetermined tension to the fixing belt **62**.

Structure of Pressure Roller

As shown in FIG. **3**, the pressure roller **61** is a cylindrical roller having a three-layer structure including a cylindrical core bar **611**, an elastic layer **612**, and a release layer **613**. The cylindrical core bar **611** is formed of metal. The elastic layer **612** may be formed of, for example, silicone rubber. The release layer **613** may be formed of, for example, fluorocarbon resin. The elastic layer **612** and the release layer **613** are formed around the core bar **611**. The pressure roller **61** is rotatably supported, and rotates in the direction of arrow C at a predetermined surface velocity. The pressure roller **61** according to the exemplary embodiment is a straight roller whose outer diameter is constant in an axial direction.

For example, a halogen heater having a rated power of 600 W is disposed as a heat-generating source in the interior of the pressure roller **61**. A temperature sensor (not shown) is disposed at the surface of the pressure roller **61** so as to contact therewith. The controller **40** (see FIG. **1**) of the image forming apparatus **1** controls turning on of the halogen heater serving as the heat-generating source on the basis of a measured temperature value obtained from the temperature sensor, and adjusts the surface temperature of the pressure roller **61** so that it is maintained at a predetermined set temperature (such as 175° C.).

As shown in FIG. **3**, guides **61**G having grooves formed so as to extend towards the pressing pad **63** are provided at respective end portions of the pressure roller **61** in the axial direction. A rotary shaft **61**S of the pressure roller **61** is slidably fitted in the grooves of the guides **61**G. As shown in FIG. **2**, disc cams **61**C whose distances from the centers of rotation to the respective circumferences are not constant are disposed at respective end portions of the rotary shaft **61**S of the pressure roller **61** so as to contact therewith. Coil springs **69** that push the rotary shaft **61**S towards the disc cams **61**C are mounted to the rotary shaft **61**S. The pressure roller **61** is urged towards the fixing belt **62** as a result of contact of the disc cams **61** with the pressure roller **61**. The pressure roller **61** holds the fixing belt **62** as a result of interposing the fixing belt **62** between the pressure roller **61** and the pressing pad **63**. Then, as shown in FIG. **3**, a nip part N serving as an area where the pressure roller **61** press-contacts the pressing pad **63** through the fixing belt **62** is formed.

Further, at the fixing device **60**, when the disc cams **61**C are rotated by driving motors (not shown), pressure at the nip part N that is formed between the pressure roller **61** and the fixing belt **62** is adjusted. More specifically, a long-diameter side of the each disc cam **61**C is brought into contact with the rotary shaft **61**S, so that the pressure roller **61** is moved along the guides **61**G, and brought closer to the fixing belt **62**. Then, in the fixing device **60**, pressure (nip pressure) applied to the fixing belt **62** by the pressure roller **61** is set to a high state (high-pressure state). In contrast, a short-diameter side of each disc cam **61**C is brought into contact with the rotary shaft **61**S, so that the pressure roller **61** is moved away from the fixing belt **62**. This causes the nip pressure in the fixing device **60** to be in a low state (low-pressure state).

Although, in the above-described exemplary embodiment, a structure in which a heat-generating source is provided in the interior of the pressure roller **61** is used, the present invention is not limited to this structure. For example, heat-generating sources may be provided in the interiors of the tension roller **66** and the roller **65** around which the fixing belt **62** is placed in a tensioned state. In addition, it is possible to set a heating device that heats the fixing belt **62** outside the fixing belt **62**.

Structure of Fixing Belt

The fixing belt **62** is a cylindrical endless belt that is seamless. The fixing belt **62** includes a base layer and a surface layer. The base layer may be formed of, for example, polyimide resin. The surface layer may be formed of, for example, fluorocarbon resin that covers a pressure-roller-**61**-side surface or both surfaces of the base layer. An elastic layer may be provided between the base layer and the surface layer of the fixing belt **62**. In this case, the elastic layer may be formed of, for example, silicone rubber whose hardness is, for example, 35° (Asker C) and whose thickness is 300 μm.

The fixing belt **62** is rotatably supported by the pressing pad **63**, the roller **65**, and the tension roller **66**, which are disposed at the inner side of the fixing belt **62**. The fixing belt **62** is disposed so as to be press-contacted by the pressure roller **61** and so as to form the nip part N through which a sheet P passes. The fixing belt **62** is driven by the pressure roller **61**, and rotates in the direction of arrow D.

Structure of Pressing Pad

The pressing pad **63** may be formed of, for example, heat-resistant resin or a metal such as iron or SUS. The surface of the pressing pad **63** is formed of an elastic material such as silicone rubber or fluorocarbon rubber. As shown in FIG. **2**, the pressing pad **63** is formed so that, in a widthwise direction of the fixing belt **62** (that is, in a direction crossing a movement direction of a sheet P), the pressing pad **63** is disposed in an area that is wider than an area along which the sheet P passes (feeding area), and so that the pressing pad **63** is pressed by the pressing roller **61** over the entire length of the pressing pad **63** in a longitudinal direction. The elastic material that is provided at the surface of the pressing pad **63** is not required. That is, the elastic material need not be provided on the surface of the pressing pad **63**.

A lubricant, such as heat-resistant grease, may be applied between the pressing pad **63** and the fixing belt **62** for reducing sliding friction force between the pressing pad **63** and the fixing belt **62** at the nip part N. This makes it possible to smoothly rotate the fixing belt **62**. In addition to applying a lubricant, it is possible to use, for example, a structure that allows smooth rotation of the fixing belt **62** by, for example, inserting a member that reduces friction resistance between the fixing belt **62** and the pressing pad **63**.

As shown in FIG. **3**, by holding the fixing belt **62** with the pressing pad **63**, a curved portion is formed in the fixing belt **62** at a downstream-side end portion (hereunder referred to as "pad end portion PE") of the pressing pad **63**. A sheet P that reaches the curved portion of the fixing belt **62** formed by the pad end portion PE is separated from the fixing belt **62** by a change in curvature of the fixing belt **62**. Accordingly, in the fixing device **60** to which the exemplary embodiment is applied, a separation position of the sheet P at the fixing belt **62** is set on the basis of the position of the pad end portion PE.

Here, with reference to FIGS. **4**A and **4**B, a change in the width of the nip part N as a compressive force applied to the fixing belt **62** by the pressure roller **61** changes will be described in detail.

FIG. **4**A illustrates the fixing device **60** in the high-pressure state, whereas FIG. **4**B illustrates the fixing device **60** in the low-pressure state.

In the exemplary embodiment, for example, the controller **40** adjusts the nip pressure in the fixing device **60** on the basis of information regarding the thickness of a sheet P obtained when a print instruction is received. The adjustment of the nip pressure is performed for, for example, achieving optimal gloss in accordance with a sheet P. In the exemplary embodiment, fixing is performed on thick paper while the nip pressure generated by the pressure roller **61** is set high. In contrast, fixing is performed on thin paper while the nip pressure generated by the pressure roller **61** is set low.

As shown in FIG. **4**A, by bringing the long-diameter side of each disc cam **61**C into contact with the rotary shaft **61**S of the pressure roller **61**, the pressure roller **61** is pressed towards and into the pressing pad **63**. As shown in FIG. **4**A, the nip part N is formed by the pressure roller **61** and the fixing belt **62**. In this state, the position of a downstream-side end portion of the nip part N (hereunder referred to as "nip end portion NE") and the position of the pad end portion PE are aligned with each other.

In contrast, by bringing the short-diameter side of each disc cam **61**C into contact with the rotary shaft **61**S of the pressure roller **61**, the distance between the pressure roller **61** and the fixing belt **62** is larger than that when the fixing device **60** is in the high pressure state. As a result, as shown in FIG. **4**B, the width of the nip part N in the low-pressure state is less than the width of the nip part N in the high-pressure state. Therefore, the position of the nip end portion NE in the low-pressure state moves towards an upstream side of the nip part N compared to that in the high-pressure state. Here, when the nip pressure changes from the high-pressure state to the low-pressure state, the position of the pad end portion PE of the pressing pad **63** does not change. Therefore, a certain gap is formed between the pad end portion PE and the nip end portion NE. In between the pad end portion PE and the nip end portion NE, an area where a sheet P does not receive pressure from the pressure roller **61** (hereunder referred to as "no-pressure application area") is formed.

Ordinarily, a sheet P moves along the fixing belt **62**. As shown in FIGS. **4**A and **4**B, the sheet P is not capable of following the fixing belt **62** at the curved portion of the fixing belt **62** that is positioned at the pad end portion PE, as a result of which the sheet P tries to separate from the fixing belt **62**.

Here, it is known that, for example, as in the low-pressure state shown in FIG. **4**B, with increasing distance between the pad end portion PE and the nip end portion NE, even if a curved portion is formed, it becomes difficult to separate the sheet P from the fixing belt **62**. Therefore, unless the distance between the pad end portion PE and the nip end portion NE is within a predetermined range, the separability is reduced.

In the exemplary fixing device **60** to which the exemplary embodiment is applied, for maintaining the separability, it is desirable for the length of the no-pressure application area to be within, for example, 500 μm or less.

In the exemplary embodiment, if the sheet P to be subjected to a fixing operation is, for example, a thin sheet, the nip pressure in the fixing device **60** is set in the low-pressure state and the fixing operation is performed for providing the sheet P with optimal gloss. Here, if the sheet P is a thin sheet, the stiffness of the sheet P is weak, as a result of which the separability of the thin sheet P is less than that of a thick sheet having a strong stiffness. Therefore, when, in order to reduce the nip pressure in the nip part N, the pressure roller **61** is moved away from the pressing pad **63**, the no-pressure application area is consequentially increased, thereby further reducing the separability.

In addition, when the distance between the pad end portion PE and the nip end portion NE is increased, so that the length of the no-pressure application area is increased, it is known that what is called blistering tends to occur. In the blistering, a defect occurs in an image due to, for example, water vapor or expanding air generated from heated toner or sheet P. This causes an image defect to occur. Consequently, from the viewpoint of suppressing the occurrence of image defect, it is necessary to set the length of the no-pressure application area within a certain range.

Accordingly, the fixing device **60** to which the exemplary embodiment is applied is provided with an adjusting mechanism that adjusts the length of the no-pressure application area so that it is within a certain range before and after the compressive force applied to the fixing belt **62** by the pressure roller **61** is changed.

FIGS. **5**A and **5**B illustrate an adjusting mechanism (an adjusting section) of the fixing device **60** to which a first exemplary embodiment is applied.

As shown in FIG. **5**A, the fixing device **60** according to the first exemplary embodiment is provided with a rotary shaft **71** that rotatably holds the pressing pad **63**. As shown in FIG. **5**B, the rotary shaft **71** is mounted along a widthwise direction of the pressing pad **63**. A gear **72** is secured to the rotary shaft **71**. Power is transmitted to the rotary shaft **71** from a gear **73**, connected to a driving motor M**1**, through the gear **72**. By rotating the rotary shaft **71** by a predetermined angle, a rotation angle of the pressing pad **63** is adjusted. The pressing pad **63** is capable of rotating either in a forward direction or a reverse direction. Therefore, the pressing pad **63** rotates around the rotary shaft **71** either in a direction of the upstream side or in a direction of a downstream side of the nip part N. The driving motor M**1** according to the exemplary embodiment may be, for example, a stepping motor.

As described with reference to FIGS. **4**A and **4**B, in the fixing device **60** to which the exemplary embodiment is applied, the nip pressure is set to two pressure states, that is, the high-pressure state and the low-pressure state. The adjusting mechanism rotates the pressing pad **63** in accordance with each state, to adjust the position of the nip end portion NE and the position of the pad end portion PE. For example, when the nip pressure is changed from the high-pressure state to the low-pressure state, with reference to the rotation angle of the pressing pad **63** in the high-pressure state, the rotary shaft **71** is rotated by a predetermined rotation angle in a predetermined rotation direction. The predetermined rotation direction and the predetermined rotation angle are specified on the basis of a direction and an angle that allow the position of the pad end portion PE to be aligned with the position of the nip end portion NE.

In the first exemplary embodiment, the rotary shaft **71** and the driving motor M**1** function as the adjusting section.

Next, the operation of the fixing device **60** to which the first exemplary embodiment is applied will be described.

FIGS. **6**A and **6**B illustrate the operations of the fixing device **60** to which the first exemplary embodiment is applied.

In the image forming apparatus **1** according to the exemplary embodiment, when the controller **40** receives an image formation instruction, the controller **40** causes formation of toner images at the image forming units to be started. Then, the controller **40** causes the fixing device **60** that fixes the toner images formed on a sheet P to operate.

Here, when a sheet P to be subjected to a fixing operation is, for example, a thin sheet, if a nip pressure state in the current fixing device **60** is set to a high-pressure state, the nip pressure is changed from the high-pressure state to a low-pressure state. More specifically, as described with reference to FIGS. **4**A and **4**B, the disc cams **61**C are rotated by the driving motors (not shown). The disc cams **61**C cause the pressure roller **61** to move away from the fixing belt **62**, so that the nip pressure in the nip part N is set to the low-pressure state.

Then, the rotary shaft **71** of the pressing pad **63** is rotated in the direction of an arrow shown in FIG. **6**B by the driving motor M**1**. The rotary shaft **71** rotates the pressing pad **63** towards the upstream side of the nip part N (that is, a sheet-P entrance side of the nip part N). In the low-pressure state shown in FIG. **6**A, the nip end portion NE is positioned upstream from the pad end portion PE. Then, by rotating the pressing pad **63** towards the upstream side of the nip part N, the position of the pad end portion PE moves towards the upstream side of the nip part N. As a result, the position of the nip end portion NE and the position of the pad end portion PE (curved portion) are aligned with each other.

In the exemplary embodiment, after changing the nip pressure from the high-pressure state to the low-pressure state, the pressing pad **63** is moved. This makes it possible for a load of the driving motor M**1** when the pressing pad **63** is rotated to be at least lower than that when the fixing device **60** is operated in the high-pressure state. In contrast, when the nip pressure is to be changed from the low-pressure state to the high-pressure state, the pressing pad **63** is first rotated, and, then, the nip pressure is changed from the low-pressure state to the high-pressure state.

With the fixing belt **62** being heated to a predetermined temperature, a sheet P having unfixed toner images formed thereon is transported into the nip part N that is formed between the fixing belt **62** and the pressure roller **61**. In the nip part N, the sheet P and the toner images that are formed on the sheet P are heated and subjected to pressure, so that the toner images are fixed to the sheet P. Thereafter, a change in the curvature of the curved portion of the fixing belt **62** that is positioned at the pad end portion PE allows the sheet P to be separated from the fixing belt **62** and to be transported towards the sheet-discharge stacking unit.

When the nip pressure changes from the low-pressure state to the high-pressure state, the driving motor M**1** is driven to rotate the rotary shaft **71** in a direction opposite to the direction of the arrow shown in FIG. **6**B. The rotary shaft **71** causes the pressing pad **63** to rotate towards the downstream side of the nip part N (a sheet-P exist side of the nip part N). As a result, the position of the nip end portion NE and the position of the pad end portion PE (curved portion) are aligned with each other.

Second Exemplary Embodiment

Next, a fixing device **60** to which a second exemplary embodiment is applied will be described. Members, etc. corresponding to those described in the first exemplary embodiment are given the same reference numerals, and will not be described in detail below.

FIGS. **7**A and **7**B illustrate an adjusting mechanism (adjusting section) of the fixing device **60** to which the second exemplary embodiment is applied.

As shown in FIG. **7**A, in the fixing device **60** to which the second exemplary embodiment is applied, projections **74** are provided on respective end portions of a pressing pad **63** in a widthwise direction thereof (only the projection **74** at one end portion is shown in FIG. **7**A). The fixing device **60** includes guides **75** that are mounted to a housing (not shown) and that rotatably hold the projections **74**. As shown in FIG. **7**B, grooves of the guides **75** are provided along a movement direction F of a sheet P in a nip part N (that is, in a direction in which the nip part N is formed). The fixing device **60** is provided with coil springs **77** and disc cams **76** that contact the respective projections **74** and whose distances from the centers of rotation to the respective circumferences are not constant. The disc cams **76** are connected to respective driving motors M**2**. The disc cams **76** receive driving force from the driving motors M**2**, and rotate. The driving motors M**2** according to the exemplary embodiment may be stepping motors.

The coil springs **77** push the projections **74** towards the disc cams **76**. As shown in FIG. **7**B, the projections **74** of the pressing pad **73** are rotatably supported by the guides **75**, and are provided so as to be interposed between the disc cams **76** and the respective coil springs **77**.

As described with reference to FIGS. **4**A and **4**B, the nip pressure of the fixing device **60** according to the second exemplary embodiment is set to two pressure states, that is, a high-pressure state in which the nip pressure is high and a low-pressure state in which the nip pressure is low. In the fixing device **60** to which the second exemplary embodiment is applied, in accordance with the nip pressure state, the pressing pad **63** is guided by the guides **75**, and moves along the movement direction F of a sheet P at the nip part N. For example, when the nip pressure is changed from the high-pressure state to the low-pressure state, with reference to the position of the pressing pad **73** in the high-pressure state, the projections **74** that are secured to the pressing pad **63** are moved in a predetermined direction by a predetermined distance. The predetermined direction and the predetermined distance are specified on the basis of a direction and a distance that allow the position of a pad end portion PE to be aligned with the position of a nip end portion NE.

In the second exemplary embodiment, the projections **74**, the guides **75**, the disc cams **76**, the coil springs **77**, and the driving motors M**2** function as an adjusting section.

FIGS. **8**A and **8**B illustrate the operations of the fixing device **60** to which the second exemplary embodiment is applied.

A controller **40** causes the fixing device **60** to operate on the basis of a print instruction. First, the controller **40** moves a pressure roller **61**, to set the nip pressure in the nip part N. For example, if a sheet P to be subjected to a fixing operation is a thin sheet, and if the nip pressure is set at the high-pressure state when the instruction is received, the pressure roller **61** moves away from a fixing belt **62**, so that the nip pressure changes from the high-pressure state to the low-pressure state. More specifically, disc cams **61**C (see FIG. **2**) are rotated by driving motors (not shown). Then, a short-diameter side of each disc cam **61**C is brought into contact with a rotary shaft **61**S of the pressure roller **61**, and the pressure roller **61** is moved away from the fixing belt **61** as shown in FIG. **8**A. This causes the nip pressure of the nip part N generated by the pressure roller **61** to be set to the low-pressure state.

Thereafter, the driving motors M**2** are driven to rotate the disc cams **76** in the direction of an arrow shown in FIG. **8**B. Then, a large-diameter side of each disc cam **76** is brought into contact with the corresponding projection **74**. The projections **74** move against spring forces of the coil springs **77** towards an upstream side of the nip part N. At this time, the projections **74** are guided by the grooves of the guides **75**, and move along the direction in which the nip part N is formed. Here, in the low-pressure state shown in FIG. **8**A, the pad end portion PE is positioned downstream from the nip end portion NE. In addition, as mentioned above, by changing the position of the pressing pad **63**, the position of the pad end portion PE moves from a downstream side of the nip part N to the upstream side of the nip part N, so that the position of the nip end portion NE and the position of the pad end portion PE (curved portion) are aligned with each other.

When the nip pressure is changed from the low-pressure state to the high-pressure state, the driving motors M**2** rotate the disc cams **76** in a direction opposite to the direction of the arrow shown in FIG. **8**B. The projections **74** are brought into contact with short-diameter sides of the disc cams **76**. Then, the projections **74** are pushed back by the respective coil springs **77**. At this time, the projections **74** are guided by the guides **75**, and move towards the downstream side of the nip part N. Even in this case, the position of the nip end portion NE and the position of the pad end portion PE (curved portion) are aligned with each other.

Third Exemplary Embodiment

Next, a fixing device **60** to which a third exemplary embodiment is applied will be described. Members, etc. corresponding to those described in the first exemplary embodiment are given the same reference numerals, and will not be described in detail below.

FIGS. **9**A and **9**B illustrate an adjusting mechanism (adjusting section) of the fixing device **60** to which the third exemplary embodiment is applied.

A pressing pad **63** according to the third exemplary embodiment includes blocks that are divided in a movement direction of a fixing belt **62** (that is, in a movement direction F of a sheet P at a nip part P). As shown in FIG. **9**A, the pressing pad **63** according to the third exemplary embodiment includes a first pressing pad **631**, which is positioned at an upstream side of the nip part N, and a second pressing pad **632**, which is positioned at a downstream side of the nip part N. As shown in FIG. **9**B, the first pressing pad **631** and the second pressing pad **632** are connected to each other. A connecting portion **63**R that connects the first pressing pad **631** and the second pressing pad **632** to each other is formed by a groove **631***a* and a protrusion **632***b* that allow the members to engage each other. In the exemplary embodiment, the groove **631***a* and the protrusion **632***b* constituting the connecting portion **63**R are formed in a direction that is perpendicular to the nip part N.

The first pressing pad **631** is secured to a housing (not shown). The second pressing pad **632** is capable of sliding along the groove **631***a* of the connecting portion **63**R. In addition, the second pressing pad **632** moves towards and away from a surface of a fixing belt **62** constituting the nip part N.

Driving for moving the second pressing pad **632** towards and away from the fixing belt **62** is performed by the following mechanism. Projections **81** are provided on respective end portions of the pressing pad **632** in a widthwise direction thereof (only the projection **81** at one end portion of the second pressing pad **632** is shown in FIGS. **9**A and **9**B). A disc cam **82** and a coil spring **83** contact the corresponding projection **81**. Each disc cam **82** has a shape in which the distance from the center of rotation to the circumference is not constant, and presses the corresponding projection **81** towards the nip part N. Each coil spring **83** pushes the corresponding projection **81** towards the corresponding disc cam **82**. Driving motors M**3** are connected to the respective disc cams **82**. The disc cams **82** receive driving forces from the driving motors M**3**, and rotate. The driving motors M**3** according to the exemplary embodiment may be stepping motors.

As described with reference to FIGS. **4**A and **4**B, the nip pressure of the fixing device **60** according to the third exemplary embodiment is set to two pressure states, that is, a high-pressure state in which the nip pressure is high and a low-pressure state in which the nip pressure is low. The adjusting mechanism of the fixing device **60** according to the third exemplary embodiment causes the second pressing pad **632** to move away from or contact the nip part N in accordance with each state. For example, in the low-pressure state, the adjusting mechanism causes the second pressing pad **632** to move away from and retreat from the fixing belt **62**. In contrast, in the high-pressure state, the adjusting mechanism causes the second pressing pad **632** to move towards and contact the fixing belt **62**.

The position of a boundary between the first pressing pad **631** and the second pressing pad **632** is set so that the position of a nip end portion NE and the position of a pad end portion PE are aligned with each other before and after the nip pressure changes. That is, the position of the boundary between the first pressing pad **631** and the second pressing pad **632** is set at the position of the nip end portion NE that is provided in the low-pressure state.

In the third exemplary embodiment, the projections **81**, the disc cams **82**, the coil springs **83**, and the driving motors M**3** function as the adjusting section.

FIGS. **10**A and **10**B illustrate the operations of the fixing device **60** to which the third exemplary embodiment is applied.

A controller **40** causes the fixing device **60** to operate on the basis of a print instruction. For example, if a sheet P to be subjected to a fixing operation is a thin sheet, and if the nip pressure is set at the high-pressure state when the instruction is received, a pressure roller **61** moves away from a fixing belt **62**, so that the nip pressure changes from the high-pressure state to the low-pressure state. More specifically, disc cams **61**C (see FIG. **2**) are rotated by driving motors (not shown). Then, a short-diameter side of each disc cam **61**C is brought into contact with a rotary shaft **61**S of the pressure roller **61**, and the pressure roller **61** is moved away from the fixing belt **61** as shown in FIG. **8**A. This causes the nip pressure of the nip part N generated by the pressure roller **61** to be set to the low-pressure state.

Thereafter, the driving motors M**3** are driven to rotate the disc cams **82** in the direction of an arrow shown in FIG. **10**B. Then, when the short-diameter side of each disc cam **82** is brought into contact with the corresponding projection **81**, each projection **81** is moved away from the nip part N by its corresponding coil spring **83**. Then, the second pressing pad **632** moves away from the fixing belt **62**.

Here, in the low-pressure state shown in FIG. **10**A, the pad end portion PE is formed by a downstream-side end portion of the second pressing pad **632**. Then, as mentioned above, by moving the second pressing pad **632** away from the fixing belt **62**, the pad end portion PE is formed by a downstream-side end portion of the first pressing pad **631**. In the exemplary embodiment, for example, a tension roller **66** (see FIG. **2**) applies tension to the fixing belt **62**. Therefore, after the second pressing pad **632** moves away from the fixing belt **62**, the downstream-side end portion of the first pressing pad **631** forms a curved portion of the fixing belt **62**.

The first pressing pad **631** is positioned upstream from the second pressing pad **632**. Therefore, by moving the second pressing pad **632** away from the fixing belt **62**, the position of the pad end portion PE (curved portion) moves from the downstream side to the upstream side of the nip part N before and after the nip pressure changes. As a result, the position of the nip end portion NE and the position of the pad end portion PE (curved portion) are aligned with each other.

When the nip pressure changes from the low-pressure state to the high-pressure state, the driving motors M**3** rotate the disc cams **82** in a direction opposite to the direction of the arrow shown in FIG. **10**B. Long-diameter sides of the disc cams **82** contact the respective projections **81**. The second pressing pad **632** provided with the projections **81** try to move along the grooves **631***a* of the connecting portion **63**R. Therefore, the second pressing pad **632** moves towards the fixing belt **62** forming the nip part N, and eventually contacts the fixing belt **62**.

In the exemplary embodiment, the pressing pad **63** is described as being divided in two. Here, the number of divisions of the pressing pad **63** may be three or more. In this case, of three or more blocks of the pressing pad **63** that is divided into the three or more blocks, the block that is positioned at a downstream side in the movement direction F of a sheet P is moved towards or away from the fixing belt **62**, to align the position of the nip end portion NE and the position of the pad end portion PE (curved portion) with each other.

Fourth Exemplary Embodiment

Next, a fixing device **60** to which a fourth exemplary embodiment is applied will be described. Members, etc. corresponding to those described in the first exemplary embodiment are given the same reference numerals, and will not be described in detail below.

FIG. **11** illustrates an adjusting mechanism (adjusting section) of the fixing device **60** to which the fourth exemplary embodiment is applied.

In the fixing device **60** to which the fourth exemplary embodiment is applied, changing of a nip pressure and alignment of a nip end portion NE and a pad end portion PE with each other are performed at the same time by adjusting a direction of movement of the pressure roller **61** when it is moved.

The fixing device **60** to which the fourth exemplary embodiment is applied includes guides **93** that guide the direction of movement of the pressure roller **61**. The guides **93** are formed at respective end portions of the pressure roller **61** in an axial direction thereof. Each guide **93** has a groove having a predetermined shape. A rotary shaft **61**S of the pressure roller **61** is slidably fitted to the grooves of the guides **93**. As shown in FIG. **11**, the groove of each guide **93** has a shape including a component in a direction in which the pressure roller **61** is moved for changing the nip pressure from a low-pressure state to a high-pressure state and a component in a direction in which the pressure roller **61** is moved for aligning the position of the nip end portion NE and the position of the pad end portion PE when the nip pressure is changed.

Here, the shape of the groove of each guide **93** will be described in more detail.

A direction of movement of the pressure roller **61** when the nip pressure is changed from the high-pressure state to the low-pressure state corresponds to a downward direction in FIG. **11** in which the pressure roller **61** moves away from the pressing pad **63**. A direction of movement of the pressure roller **61** for moving the nip end portion NE towards and aligning the nip end portion NE with the pad end portion PE (that is positioned downstream relative to the nip end portion NE) when the nip pressure of the fixing device **60** is changed from the high-pressure state to the low-pressure state corresponds to a rightward direction in FIG. **11**.

In contrast, a direction of movement of the pressure roller **61** when the nip pressure is changed from the low-pressure state to the high-pressure state corresponds to an upward direction in FIG. **11** in which the pressure roller **61** is moved towards the pressing pad **63**. A direction of movement of the pressure roller **61** for moving the nip end portion NE towards and aligning the nip end portion NE with the pad end portion PE when the nip pressure of the fixing device **60** is changed from the high-pressure state to the low-pressure state corresponds to a leftward direction in FIG. **11**.

Therefore, as shown in FIG. **11**, the groove of each guide **93** is formed so that the changing of the nip pressure and the aligning of the pad end portion PE and the nip end portion NE with each other are performed. More specifically, in the exemplary embodiment, the groove of each guide **93** is formed so as to extend obliquely downward and rightwards in FIG. **11** (that is, obliquely upward and leftwards in FIG. **11**) at a predetermined angle from a movement direction F of a sheet P at a nip part N.

In the fixing device **60** to which the fourth exemplary embodiment is applied, a mechanism for moving the pressure roller **61** along the guides **93** has the following structure.

Disc cams **91** and coil springs **92** are disposed at and in contact with the rotary shaft **61**S of the pressure roller **61**. Each disc cam **91** has a shape in which the distance from the center of rotation to the circumference is not constant. The coil springs **92** push the rotary shaft **61**S towards the disc cams **91**. Driving motors M**4** are connected to the coil springs **92**. The disc cams **91** receive rotational driving power from the driving motors M**4**, and rotate. The driving motors M**4** according to the exemplary embodiment may be stepping motors.

In the fourth exemplary embodiment, the disc cams **91**, the coil springs **92**, the guides **93**, and the driving motors M**4** function as the adjusting section.

FIG. **12** illustrates the operations of the fixing device **60** to which the fourth exemplary embodiment is applied.

Here, an example in which a sheet P to be subjected to a fixing operation is a thin sheet, and in which the nip pressure in the fixing device **60** is changed from the high-pressure state to the low-pressure state will be described.

In the image forming apparatus **1** according to the exemplary embodiment, when a controller **40** receives an image formation instruction, the controller **40** causes formation of toner images at image forming units to be started. Then, the controller **40** causes the fixing device **60** that fixes the toner images formed on a sheet P to operate.

In this exemplary embodiment, first, the driving motors M**4** are driven to rotate the disc cams **91**. Then, a short-diameter side of each disc cam **91** comes into contact with the rotary shaft **61**S of the pressure roller **61**. The rotary shaft **61**S of the pressure roller **61** receives force from the coil springs **92**, and moves along the guides **93** in a lower-right direction in FIG. **12**. That is, the rotary shaft **61**S of the pressure roller **61** moves away from the pressing pad **63** from an upstream side to a downstream side of the nip part N.

By moving the pressure roller **61** away from the pressing pad **63**, the nip pressure is changed from the high-pressure state to the low-pressure state. By moving the pressure roller **61** from the upstream side to the downstream side in the movement direction F of a sheet P, the position of the nip end portion NE is moved from the upstream side to the downstream side of the nip part N.

Here, as described with reference to FIGS. **4**A and **4**B, when the pressure roller **61** is moved in a direction perpendicular to a surface of the fixing belt **62** defined by the pressing pad **63**, and the low-pressure state is set, the pad end portion PE is positioned downstream from the nip end portion NE.

In contrast, in the fixing device **60** to which the fourth exemplary embodiment is applied, by moving the position of the pressure roller **61** from the upstream side to the downstream side, the position of the nip end portion NE is moved from the upstream side to the downstream side. Accordingly, in the fixing device **60** to which the fourth exemplary embodiment is applied, the position of the nip end portion NE and the position of the pad end portion PE (curved portion) are maintained before and after changing the nip pressure.

As described in each of the first to fourth exemplary embodiments, in the fixing device **60**, the position of the nip end portion NE and the position of the pad end portion PE are adjusted as the nip pressure is changed. This suppresses a reduction in the separability of a sheet P at the fixing device **60**. It is possible to suppress a reduction in the separability of the sheet P from the fixing belt **62** as long as at least the length of the no-pressure application area is within a predetermined range (such as within 500 μm). Therefore, the present invention is not necessarily limited to eliminating the no-pressure application area by aligning the position of the nip end portion NE and the position of the pad end portion PE with each other.

It is possible to combine, for example, the mode in which the pressing pad **63** is moved and adjusted as described in the second exemplary embodiment and the mode in which the pressure roller **61** is moved and adjusted as described in the fourth exemplary embodiment. That is, the adjustment of the position of the nip end portion NE and the position of the pad end portion PE when the nip pressure is changed may be performed by moving both the pressing pad **63** and the pressure roller **61**.

The foregoing description of the exemplary embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the invention for various embodiments and with the various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

What is claimed is:

1. An image forming apparatus comprising:

an image forming unit that forms an image on a recording material;

an endless belt member that is rotatably provided and that has a curved portion;

a pressure member that is provided at an outer peripheral surface of the belt member so as to contact the outer peripheral surface of the belt member, the pressure member applying pressure to the belt member;

a pressing member that presses the belt member from an inner side of the belt member towards the pressure member; and

an adjusting section that adjusts a position of an end portion of a nip part at a downstream side in a movement direction of the recording material and a position of the curved portion of the belt member by moving or deforming the pressing member, the nip part being formed by the belt member and the pressure member, the curved portion of the belt member being formed by an end portion of the pressing member at a downstream side in the movement direction of the recording material,

wherein the adjusting section adjusts by moving the pressing member towards an upstream side or the downstream side in the movement direction of the recording material,

wherein the position of the curved portion of the belt member is located further downstream, in a movement direction of the recording material, than the position of the end portion of the nip part when the adjusting section adjusts by moving the pressing member towards the downstream side in the movement direction of the recording material, and

wherein the adjusting section adjusts by causing a portion of the pressing member at the downstream side in the movement direction of the recording material to move away from the belt member or to come into contact with the belt member.

2. The image forming apparatus according to claim **1**, wherein the adjusting section adjusts by rotating the pressing member around a predetermined axis.

3. A fixing device comprising:

an endless belt member that is rotatably provided and that has a curved portion;

a pressure member that is provided at an outer peripheral surface of the belt member so as to contact the outer peripheral surface of the belt member, the pressure member applying pressure to the belt member; and

a pressing member that presses the belt member from an inner side of the belt member towards the pressure member,

wherein a position of the curved portion of the belt member and a position of an end portion of a nip part at a downstream side in a movement direction of a recording material are adjusted by moving the position of the curved portion of the belt member as a result of moving or deforming the pressing member, the curved portion of the belt member being formed by an end portion of the pressing member at a downstream side in the movement direction of the recording material, the nip part being formed by the belt member and the pressure member,

wherein the pressing member is moved towards an upstream side or the downstream side of the nip part in the movement direction of the recording material,

wherein the position of the curved portion of the belt member is located further downstream, in a movement direction of the recording material, than the position of the end portion of the nip part when the adjusting section adjusts by moving the pressing member towards the downstream side in the movement direction of the recording material, and

wherein a portion of the pressing member at the downstream side in the movement direction of the recording material moves away from the belt member or comes into contact with the belt member.

4. The fixing device according to claim **3**, wherein the pressing member rotates around a predetermined axis.

5. An image forming apparatus comprising:

an image forming unit that forms an image on a recording material;

an endless belt member that is rotatably provided and that has a curved portion;

a pressure member that is provided at an outer peripheral surface of the belt member so as to contact the outer peripheral surface of the belt member, the pressure member applying pressure to the belt member;

a pressing member that presses the belt member from an inner side of the belt member towards the pressure member; and

an adjusting section that adjusts a position of an end portion of a nip part at a downstream side in a movement direction of the recording material and a position of the curved portion of the belt member by moving or deforming the pressing member, the nip part being formed by the belt member and the pressure member, the curved portion of the belt member being formed by an end portion of the pressing member at a downstream side in the movement direction of the recording material,

wherein the adjusting section adjusts by moving the pressing member towards an upstream side or the downstream side in the movement direction of the recording material,

wherein the position of the curved portion of the belt member is located further downstream, in a movement direction of the recording material, than the position of the end portion of the nip part when the adjusting section adjusts by moving the pressing member towards the downstream side in the movement direction of the recording material,

wherein when a nip pressure of the nip part is changed from a high-pressure state to a low-pressure state, the adjusting section moves or deforms the pressing member after the nip pressure is changed, and

wherein when the nip pressure of the nip part is changed from a low-pressure state to a high-pressure state, the adjusting section moves or deforms the pressing member before the nip pressure is changed.

6. An image forming apparatus comprising:

an image forming unit that forms an image on a recording material;

an endless belt member that is rotatably provided and that has a curved portion;

a pressure member that is provided at an outer peripheral surface of the belt member so as to contact the outer peripheral surface of the belt member, the pressure member applying pressure to the belt member;

a pressing member that presses the belt member from an inner side of the belt member towards the pressure member; and

an adjusting section that adjusts a position of an end portion of a nip part at a downstream side in a movement direction of the recording material and a position of the curved portion of the belt member by moving or deforming the pressing member, the nip part being formed by the belt member and the pressure member, the curved portion of the belt member being formed by an end portion of the pressing member at a downstream side in the movement direction of the recording material,

wherein the adjusting section adjusts by moving the pressing member towards an upstream side or the downstream side in the movement direction of the recording material,

wherein the position of the curved portion of the belt member is located further downstream, in a movement direction of the recording material, than the position of the end portion of the nip part when the adjusting section adjusts by moving the pressing member towards the downstream side in the movement direction of the recording material, and

wherein the adjusting section adjusts the position of the pressing member without rotating the pressing member.

7. The image forming apparatus according to claim **6**, wherein the adjusting section is provided inside of the belt member.

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